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Application No.: 10/618,197

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1–4 (Cancelled)

5. (Currently amended) An image process program for inputting a digital image wherein one or more color components are non-existent in each pixel, obtained from one of a single-sensor image-pickup system, a double-sensor image-pickup system, and a triple-sensor pixel spatial offset image-pickup system, estimating the non-existent color component for each pixel so as to output a color digital image, the program comprising the steps of:

combination average calculation processing for combining two or more pixels, from a plurality of pixels having a similar same color component as a color component non-existent in a pixel of interest, near [a] the pixel of interest, and calculating an average for each combination of the color components of two or more pixels for a plurality of different combinations of pixels in a region near the pixel of interest;

color correlation calculation processing for calculating parameters to be used in a function for estimating the color component non-existent in the pixel of interest from one kind of color component from a different kind of color component within the region obtained in the pixel of interest, near the pixel of interest, using two kinds of color components: the same color component as the color component non-

existent in the pixel of interest; and a same color component as the color component obtained in the pixel of interest, and estimating [[a]] the color component non-existent in the pixel of interest by said function using the parameters and [[a]] the color component obtained in the pixel of interest; and

combination selection processing for selecting one of the plurality of combination averages calculated by combination average calculation processing, as the non-existent color component for the pixel of interest, based upon the color component estimated by color correlation calculation processing.

6. (Currently amended) The image processing program according to Claim 5, wherein the combination average calculation processing further includes the steps of:

processing for calculating fluctuation of the color component within the combination of two or more pixels;

wherein the color correlation calculation processing further includes calculating reliability of the calculated parameters;

and wherein, in the event that the reliability calculated is high, performing color correlation calculation processing to select one of the plurality of combination averages calculated by combination average calculation processing as the non-existent color component of the pixel of interest, based upon the color component estimated by the color correlation calculation processing, and in the event that the reliability is low, the combination selection processing selects selecting the combination average corresponding to the combination wherein fluctuation of the color component calculated by the combination average calculation processing is least as the non-existent color component.

7. (Currently amended) An image processing program for inputting a digital image wherein one or more color components are non-existent in each pixel, obtained from one of a single-sensor image-pickup system, a double-sensor image-pickup system, and a triple-sensor pixel spatial offset image-pickup system, estimating the non-existent color component for each pixel to output a color digital image, comprising the steps of:

initial, non-existent color component generating processing for combining two or more pixels from a plurality of pixels having [[the]] a same color component as a color component non-existent in a pixel of interest, near [[a]] the pixel of interest, calculating an average for each combination of color component values of two or more pixels for a plurality of different combinations of pixels in a region near the pixel of interest, and selecting one of the calculated averages as the non-existent color component;

second non-existent color component generating processing for calculating parameters to be used in a function for estimating the color component non-existent in the pixel of interest from one kind of color component from a different kind of color component within the region obtained in the pixel of interest, near the pixel of interest, using two kinds of color components: the same color component as the color component non-existent in the pixel of interest; and a same color component as the color component obtained in the pixel of interest, and estimating [[a]] the color component non-existent in the pixel of interest by said function using the parameters and [[a]] the color component obtained in the pixel of interest, thereby generating the non-existent color component of the pixel of interest; and

third non-existent color component generating processing for calculating a weighted average for the non-existent color component generated by the initial non-existent color generating processing and the non-existent color component

generated by the second non-existent color component generating processing, thereby generating the non-existent color component value.

8. (Previously presented) The image processing program according to Claim 7, further comprising region judgment processing for determining whether or not the region near the pixel of interest is a texture region, and also determining whether or not the region near the pixel of interest is an edge region, wherein in the event that judgment made by the region judgment processing is that the region is a texture region, the evaluation of the reliability is increased, and conversely in the event that judgment is made that the region is an edge region, the evaluation of the reliability is decreased.

9. (Currently amended) An image processing device, comprising:
an input circuit for inputting a digital image wherein one or more color components are non-existent in each pixel, obtained from one of a single-sensor image-pickup system, a double-sensor image-pickup system, or a triple-sensor pixel spatial offset image-pickup system;

a combination average calculation circuit for combining two or more pixels from a plurality of pixels having [[the]] a same color component as a color component non-existent in a pixel of interest near [[a]] the pixel of interest within the image signals input from the input circuit, and calculating an average for the combination of the color components of two or more pixels for a plurality kinds of combinations of pixels in a region near the pixel of interest;

a color correlation calculation circuit for calculating parameters to be used in a function for estimating the color component non-existent in the pixel of interest from one kind of color component from a different kind of color component within

the region obtained in the pixel of interest, near the pixel of interest, using two kinds of color components: the same color component as the color component non-existent in the pixel of interest; and a same color component as the color component obtained in the pixel of interest, and estimating [[a]] the color component non-existent in the pixel of interest by said function using the parameters and [[a]] the color component obtained in the pixel of interest; and

a combination selection circuit for selecting one of the plurality of combination averages calculated by the combination average calculation circuits, as the non-existent color component for the pixel of interest, based upon the color component estimated by the color correlation calculation circuit.

10. (Previously presented) The image processing device according to claim 9,

wherein the combination average calculation circuit further calculates the fluctuation of the color component within the combination of two or more pixels;

wherein the color correlation calculation circuit further calculates the reliability of the calculated parameters;

and wherein, in the event that the reliability is high, the color correlation calculation circuit selects one of the plurality of combination averages calculated by the combination average calculation circuit as the non-existent color component for the pixel of interest, based upon the color component estimated by the color correlation calculation circuit,

and, in the event that the reliability is low, the combination selection circuit selects the combination average corresponding to the combination wherein the fluctuation of the color component calculated by the combination average calculation circuit is the least, as the non-existent color component.

11. (Currently amended) An image processing device, comprising:
- an input circuit for inputting a digital image wherein one or more color components are non-existent in each pixel, obtained from one of a single-sensor image-pickup system, a double-sensor image-pickup system, and a triple-sensor pixel spatial offset image-pickup system;
- a first non-existent color component generating circuit for combining two or more pixels from a plurality of pixels having [[the]] a same color component as a color component non-existent in a pixel of interest near the pixel of interest within the image signals input from the input circuit, calculating the average for the combination of the color components of two or more pixels for a plurality of kinds of combinations in a region near the pixel of interest, and selecting one of the calculated averages to generate the non-existent color component;
- a second non-existent color component generating circuit for calculating parameters to be used in a function for estimating the color component non-existent in the pixel of interest from one kind of color component from a different kind of color component within the region obtained in the pixel of interest, near the pixel of interest, using two kinds of color components: the same color component as the color component non-existent in the pixel of interest; and a same color component as the color component obtained in the pixel of interest, and estimating [[a]] the color component non-existent in the pixel of interest by said function using the parameters and a color component obtained in the pixel of interest, thereby generating the non-existent color component of the pixel of interest; and
- a third non-existent color component generating circuit for calculating a weighted average for the non-existent color component generated by the first non-existent color generating circuit and the non-existent color component generated by

the second non-existent color component generating circuit, thereby generating the non-existent color component value.

12. (Currently amended) An image processing device, comprising:

input means for inputting a digital image wherein one or more color components are non-existent in each pixel, obtained from one of a single-sensor image-pickup system, a double-sensor image-pickup system, and a triple-sensor pixel spatial offset image-pickup system;

combination average calculation means for combining two or more pixels from a plurality of pixels having [[the]] a same color component as a color component non-existent in a pixel of interest, near [[a]] the pixel of interest within image signals input from the input means, and calculating an average for the combination of the color components of two or more pixels for a plurality kinds of combinations of pixels in a region near the pixel of interest;

color correlation calculation means for calculating parameters to be used in a function for estimating the color component non-existent in the pixel of interest from one kind of color component from a different kind of color component within the region obtained in the pixel of interest, near the pixel of interest, using two kinds of color components: the same color component as the color component non-existent in the pixel of interest; and a same color component as the color component obtained in the pixel of interest, and estimating [[a]] the color component non-existent in the pixel of interest by said function using the parameters and [[a]] the color component obtained in the pixel of interest; and

combination selection means for selecting one of the plurality of combination averages calculated by the combination average calculation means, as the non-

existent color component for the pixel of interest, based upon the color component estimated by the color correlation calculation means.

13. (Previously presented) The image processing device according to claim 12,

wherein the combination average calculation means further calculates a fluctuation of the color component within the combination of two or more pixels;

wherein the color correlation estimation calculation means further calculates reliability of the calculated parameters; and

wherein, in the event that the reliability is high, the color correlation calculation means selects one of the plurality of combination averages calculated by the combination average calculation means as the non-existent color component of the pixel of interest, based upon the color component estimated by the color correlation calculation means; and

in the event that the reliability is low, the combination selection means selects the combination average corresponding to the combination wherein the fluctuation of the color component calculated by the combination average calculation means is the least, as the non-existent color component.

14. (Current amended) An image device, comprising:

input means for inputting a digital image wherein one or more color components are non-existent in each pixel, obtained from one of a single-sensor image-pickup system, a double-sensor image-pickup system, and a triple-sensor pixel spatial offset image-pickup system;

first non-existent color component generating means for combining two or more pixels from a plurality of pixels having [[the]] a same color component as a

color component non-existent in a pixel of interest near [[a]] the pixel of interest within image signals input from the input means, calculating an average for the combination of the color components of two or more pixels for a plurality of kinds of combinations in a region near the pixel of interest, and selecting one of the calculated averages to generate the non-existent color component;

second non-existent color component generating means for calculating parameters to be used in a function for estimating the color component non-existent in the pixel of interest from one kind of color component from a different kind of color component within a region obtained in the pixel of interest, near the pixel of interest, using two kinds of color components: the same color component as the color component non-existent in the pixel of interest; and a same color component as the color component obtained in the pixel of interest, and

third non-existent color component generating means for calculating the weighted average for the non-existent color component generated by the first non-existent color generating means and the non-existent color component generated by the second non-existent color component generating means, thereby generating the non-existent color component value.

15. (Previously presented) The image processing device according to claim 14, further comprising weighting region setting means for selecting a pixel set for calculating a weight to be used to calculate the weighted average within the region near the pixel of interest,

wherein the third non-existent color component generating means uses a value calculated based upon a statistical amount of pixel values of the pixel set, as a weight to be used to calculate the weighted average.

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16. (Previously presented) The image processing device according to claim 15 wherein the weighting region setting means lies within a region with a predetermined size near the pixel of interest and comprising a plurality of sub-regions with a size smaller than the predetermined size, and selects a target sub-region from the sub-regions based upon pixel values in the sub-regions, to set a union of pixels contained in the selected sub-region as the pixel set.

17. (Previously presented) The image processing device according to claim 15 wherein the second non-existent color component generating means calculates approximation parameters based upon pixel values of the pixel set selected by the region setting means.

18. (Previously presented) The image processing device according to claim 16, wherein the second non-existent color component generating means calculates approximation parameters based upon pixel values of the pixel set selected by the weighting region setting means.

19. (Previously presented) The image processing device according to claim 15, wherein the statistical amount represents uniformity of the pixel values of the pixel set.

20. (Previously presented) The image processing device according to claim 16, wherein the statistical amount represents uniformity of the pixel values of the pixel set.